

## PERSONAL INFORMATION

## Alan Facchinetti

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Sex Male | Date of birth 18/11/1975

## WORK EXPERIENCE

Dec 2014–Present

**Associate Professor of Applied Mechanics**

Department of Mechanical Engineering, Politecnico di Milano, Milan (Italy)

- Research activities focused on dynamics, stability and control of mechanical systems, with main application to railway vehicles and to their interaction with the infrastructure.

**Railway Vehicle Dynamics:** Simulation of railway vehicle dynamics with reference to the running behaviour and to the interaction with the infrastructure; experimental characterisation and modelling of vehicle suspensions and components; simulation and analysis of ride comfort; analysis of running safety, with particular reference to derailment conditions and to the impact of longitudinal dynamics on derailment conditions in heavy freight trains.

**Tramcar Dynamics:** Development of numerical models for the simulation of tramcar vehicles; experimental analysis through laboratory and on-track tests and validation of models by means of comparison with experimental data; evaluation of the dynamic behaviour of the tramcar with particular reference to wheel-rail contact forces, to running safety and flange-climb derailment, to tramcar induced squeal noise, to induced damages and track degradation.

**Pantograph-Catenary Interaction:** Development of numerical and laboratory tools for the analysis of the pantograph-catenary interaction; design, realisation and development of a test-rig for the hybrid (HIL) simulation of the pantograph-catenary interaction; experimental on-track tests and validation of numerical and hybrid tools by means of comparison with on-track experimental data; analysis and optimisation of multiple collection operation; simulation of pantograph-catenary interaction in the medium-high frequency range and prediction of wear evolution.

**Active Control, Monitoring and Diagnostics in Railway Vehicles:** Development of active suspension systems for high speed railway vehicles; development of active systems for tramcar bogies; active control of pantographs; development of diagnostic and monitoring methodologies for the pantograph-catenary system.

**Floating Offshore Wind Turbine:** Development of HIL methodologies for reproducing the effect of the sea induced motion during testing of scale model.

- Person in charge for the test-rig for dynamic tests on pantograph.
- Person and technician in charge for the calibration tests (ISO 9001 certified) on pantograph force-measurement systems according to EN50317 standard.
- Lecturer in "Automation and Control Laboratory" (in English)

5 Credits, Master of Science in Automation Engineering, Politecnico di Milano.

Main topics: methodologies for automated system modelling; process simulation and control; electrical drives, pneumatic and hydraulic actuators; robotics laboratory; active control of mechanical systems.

- Lecturer in "Mechanics" (in Italian)

5 Credits, Bachelor of Science in Engineering of Computing Systems, Politecnico di Milano.

Main topics: kinematics, statics and dynamics of rigid bodies; interactions in mechanical systems; dynamics of machines.

- Faculty advisor of Polimi Motorcycle Factory (team participating to the Motostudent competition).

Feb 2005–Dec 2014

**Researcher in Applied Mechanics**

Department of Mechanical Engineering, Politecnico di Milano, Milan (Italy)

Research activities on railway/tramcar vehicle dynamics, numerical and experimental analysis of pantograph-catenary interaction, development of pantograph active control applications and overhead

contact line diagnostics.

Participation to EU projects in the VI and VII Framework Programme (SPURT "Seamless Public Urban Rail Transport", EUROPAC "European Optimised Pantograph Catenary Interface", PantoTRAIN "Pantograph and catenary interaction: Total Regulatory Acceptance for the Interoperable Network").

Jan 2001–Jan 2005

**Research fellow**

Department of Mechanical Engineering, Politecnico di Milano, Milan (Italy)

Topic: "Vibrations of mechanical systems (Diagnostics)."

Research activities concerning railway vehicle dynamics, pantograph-catenary interaction, active control of mechanical systems and rotor dynamics.

**EDUCATION AND TRAINING**

Jan 2001–May 2004

**PhD in Applied Mechanics (cum laude)**

EQF level 8

Politecnico di Milano

Dissertation: "Mathematical Model to Analyse the Dynamic Behaviour of Tramcar Vehicles."

Sep 1994–Jun 2000

**MSc in Mechanical Engineering (5-year study)**

EQF level 7

School of Industrial Engineering, Politecnico di Milano, Milan (Italy)

Thesis: "Pantograph models to analyse the interaction with the catenary, applied to the study of contact wire wear."

**PERSONAL SKILLS**

Mother tongue(s)

Italian

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C2	C1	C1	C1

Levels: A1 and A2: Basic user - B1 and B2: Independent user - C1 and C2: Proficient user  
 Common European Framework of Reference for Languages

Communication skills

Good communication skills, good attitude in working in a team and good public relation skills, also in international setting, gained in the work experience (teaching and research) at university and participating to conferences and to national and EU projects.

Organisational / managerial skills

Experience in the technical management of research projects, also in international setting, gained during the coordination and management of EU project activities (EUROPAC, PantoTRAIN).

Job-related skills

Set up and execution of lab tests for the dynamic characterisation of pantographs.  
 Set up and execution of lab tests for the dynamic characterisation of pantographs for calibration and verification of measuring systems of pantograph-catenary contact forces according to EN 50317.  
 Set up and execution of lab tests for the characterisation of railway suspensions and mechanical systems in general.  
 Set up and execution Coordination, set up and execution of line tests for the analysis of railway vehicle dynamics and pantograph-catenary interaction.

Digital competence

SELF-ASSESSMENT

Information processing	Communication	Content creation	Safety	Problem solving
Proficient user	Proficient user	Proficient user	Proficient user	Independent user

**Digital competences - Self-assessment grid**

Advanced user of Windows, GNU/Linux and MacOS platforms.  
 Advanced Microsoft Office user, with particular reference to Word, Excel and PowerPoint.  
 Intermediate Tex/LaTeX user.  
 Advanced user of Matlab/Simulink environment  
 Advanced Fortran programmer.  
 Basic base C, C++ and Labview programmer.  
 Intermediate Autocad user.  
 Basic MSC Adams and SIMPACK user.  
 Developer of custom codes for the simulation of railway/tramcar vehicle dynamics and pantograph-catenary interaction.

Driving licence A, B

**ADDITIONAL INFORMATION**

**Memberships**

Member of CEI (Comitato Elettrotecnico Italiano) subcommittee SC 9C "Impianti fissi di trazione."  
 IT expert in CENELEC Working Group 9XC/WG 07 "Railway applications - Current collection systems - Requirements for and validation of measurements of the dynamic interaction between pantograph and overhead contact line."  
 IT expert in CENELEC Working Group 9X/WG 27 "Survey group Current collectors on commercial road vehicles in overhead contact line operation."  
 Member of American Society of Mechanical Engineers (ASME).  
 Registered Engineer to the Milan Order of Engineers.

**Publications**

Author/co-author of more than 80 publications, most of which published on peer-reviewed journals or presented at international conferences.  
 Most relevant publications:  
 Bruni S, Bucca G, Carnevale M, Collina A, Facchinetti A. Pantograph–catenary interaction: recent achievements and future research challenges. *International Journal of Rail Transportation*. 2017;in publication. doi:10.1080/23248378.2017.1400156.  
 Carnevale M, Facchinetti A, Rocchi D. Procedure to assess the role of railway pantograph components in generating the aerodynamic uplift. *Journal of Wind Engineering and Industrial Aerodynamics*. 2017;160:16-29. doi:10.1016/j.jweia.2016.11.003.  
 Carnevale M, Facchinetti A, Maggiori L, Rocchi D. Computational fluid dynamics as a means of assessing the influence of aerodynamic forces on the mean contact force acting on a pantograph. *Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit*. 2016;230(7):1698-1713. doi:10.1177/0954409715606748.  
 Collina A, Bruni S, Facchinetti A, Zuin A. PCaDA statement of methods. *Vehicle System Dynamics*. 2015;53(3):347-356. doi:10.1080/00423114.2014.959027.  
 Facchinetti A, Bruni S. Special issue on the pantograph-catenary interaction benchmark. *Vehicle System Dynamics*. 2015;53(3):303-304. doi:10.1080/00423114.2015.1017308.  
 Colombo EF, Di Gialleonardo E, Facchinetti A, Bruni S. Active carbody roll control in railway vehicles using hydraulic actuation. *Control Engineering Practice*. 2014;31:24-34. doi:10.1016/j.conengprac.2014.05.010.

- Barbera AN, Bucca G, Corradi R, Facchinetti A, Mapelli F. Electronic differential for tramcar bogies: System development and performance evaluation by means of numerical simulation. *Vehicle System Dynamics*. 2014;52(S1):405-420. doi:10.1080/00423114.2014.901543.
- Facchinetti A, Gasparetto L, Bruni S. Real-time catenary models for the hardware-in-The-loop simulation of the pantograph-catenary interaction. *Vehicle System Dynamics*. 2013;51(4):499-516. doi:10.1080/00423114.2012.748920.
- Bayati I, Belloli M, Facchinetti A, Giappino S. Wind tunnel tests on floating offshore wind turbines: A proposal for hardware-in-the-loop approach to validate numerical codes. *Wind Engineering*. 2013;37(6):557-568. doi:10.1260/0309-524X.37.6.557.
- Bruni S, Bucca G, Collina A, Facchinetti A. Numerical and hardware-in-the-loop tools for the design of very high speed pantograph-catenary systems. *Journal of Computational and Nonlinear Dynamics*. 2012;7(4). doi:10.1115/1.4006834.
- Facchinetti A, Bruni S. Hardware-in-the-loop hybrid simulation of pantographcatenary interaction. *Journal of Sound and Vibration*. 2012;331(12):2783-2797. doi:10.1016/j.jsv.2012.01.033.
- Bucca G, Carnevale M, Collina A, Facchinetti A, Drugge L, Jönsson PA. Adoption of different pantographs preloads to improve multiple collection and speed up existing lines. *Vehicle System Dynamics*. 2012;50(SUPPL. 1):403-418. doi:10.1080/00423114.2012.665165.
- Alfi S, Bruni S, Diana G, Facchinetti A, Mazzola L. Active control of airspring secondary suspension to improve ride quality and safety against crosswinds. *Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit*. 2011;225(1):84-98. doi:10.1243/09544097JRRT392.
- Facchinetti A, Mazzola L, Alfi S, Bruni S. Mathematical modelling of the secondary airspring suspension in railway vehicles and its effect on safety and ride comfort. *Vehicle System Dynamics*. 2010;48(S1):429-449. doi:10.1080/00423114.2010.486036.
- Pombo J, Ambrosio J, Pereira M, Rauter F, Collina A, Facchinetti A. Influence of the aerodynamic forces on the pantograph-catenary system for high-speed trains. *Vehicle System Dynamics*. 2009;47(11):1327-1347. doi:10.1080/00423110802613402.
- Facchinetti A, Mauri M. Hardware-in-the-loop overhead line emulator for active pantograph testing. *IEEE Transactions on Industrial Electronics*. 2009;56(10):4071-4078. doi:10.1109/TIE.2009.2023632.
- Resta F, Facchinetti A, Collina A, Bucca G. On the use of a hardware in the loop set-up for pantograph dynamics evaluation. *Vehicle System Dynamics*. 2008;46(S1):1039-1052. doi:10.1080/00423110802037891.
- Cheli F, Corradi R, Diana G, Facchinetti A. Validation of a numerical model for the simulation of tramcar vehicle dynamics by means of comparison with experimental data. *Journal of Computational and Nonlinear Dynamics*. 2007;2(4):299-307. doi:10.1115/1.2754306.
- Cheli F, Corradi R, Diana G, Facchinetti A, Gherardi F. Effect of track geometrical defects on running safety of tramcar vehicles. *Vehicle System Dynamics*. 2006;44(S1):302-312. doi:10.1080/00423110600871384.
- Collina A, Facchinetti A, Fossati F, Resta F. Hardware in the loop test-rig for identification and control application on high speed pantographs. *Shock and Vibration*. 2004;11(3-4):445-456.
- Bruni S, Bucca G, Collina A, Facchinetti A, Melzi S. Pantograph-catenary dynamic interaction in the medium-high frequency range. *Vehicle System Dynamics*. 2004;41(S1):697-706.
- Belforte P, Cheli F, Corradi R, Facchinetti A. Software for the numerical simulation of tramcar vehicle dynamics. *Heavy Vehicle Systems*. 2003;10(1-2):48-69.
- Collina A, Melzi S, Facchinetti A. On the prediction of wear of contact wire in OHE lines: A proposed model. *Vehicle System Dynamics*. 2003;37(S1):579-592.